COVER PAGE FOR MASTER'S PROJECT

Recreation, Tourism Development, and Watershed Protection in the Dan River Basin

by

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INTRODUCTION

Environmental regulations can be seen as burdens or impediments to economic development. My research aims to determine whether cities might be more willing to implement environmental protections and remediation when these activities are seen as contributing to economic development, improvements to the city's image, or higher standards of living for residents. Specifically, this project examines whether recreation and tourism development motivate cities to protect water quality. I attempted to answer this question through interviews with city government officials in Danville, VA, Martinsville, VA, Eden, NC, and Reidsville, NC, the four largest cities in the Dan River Basin.

This research attempts to address the broader question, what motivates cities and towns to make the water quality of rivers and streams a priority? If cities view rivers as amenities, are they more motivated to protect them? Conversely, if they view watershed protection as a burden, are they likely to only do the minimum that is required by state or federal regulations? The following case studies look at factors that have hindered or encouraged creating and implementing policies for protecting water in these four cities, and more specifically how recreation and tourism have influenced such policies. Exploring what motivates cities to protect water quality could provide insight into potential ways to balance economic development with environmental protections, and ways to motivate cities to go above and beyond the minimum required of them by the EPA and state agencies such as the North Carolina Division of Water Quality and the Virginia Division of Environmental Quality. Identifying the factors that motivate cities to improve water quality in nearby rivers and streams could be useful in making the case for implementing BMPs, building greenbelts along rivers, encouraging the development of non-polluting industries, or carrying out other activities to prevent water pollution. Even when the cost of water quality protections seems prohibitive, cities might be more willing to accept the costs if they believe they might experience economic gains as a result of improved amenity or recreational values.

The development of various types of recreation and tourism in this area provided an opportunity to test whether outdoor recreation stimulates environmental protection. Because these four cities have focused to greater or lesser extents on the Dan River and other rivers and lakes as a source of recreation, it was possible to compare and contrast them to observe whether their environmental policies and programs differ based on their tourism and recreation goals. For example, Eden is particularly focused on promoting outdoor activities in and around the Dan and Smith Rivers (Adams, 2010; Farmer, 2010; Stultz, 2010), and Danville is promoting its urban waterfront, which faces the Dan River (Blair, 2010; City of Danville, 2001). I hypothesized that this would result in stronger programs and policies for protecting water quality in the Dan River Basin in these two cities than in Reidsville, which depends on a lake outside of the Dan River Basin for outdoor recreation (City of Reidsville, 1990; Merritt, 2010; Pearce, 2010), or Martinsville, which only has a small part of the Smith River in its jurisdiction (City of Martinsville & West Piedmont Planning District Commission, 2008; Cody, 2010). However, my interviews with staff of these cities did not confirm this hypothesis. Instead, they indicated that tourism and recreation had relatively little influence on policies and programs intended to protect water quality, while state and federal regulations and the need to protect drinking water sources played a larger role.

BACKGROUND

THE DAN RIVER BASIN REGION

The Dan River Basin, which is split along the North Carolina and Virginia border, is a sub-basin of the Roanoke River. The basin includes the Dan River, which crosses the state border at six locations, the Smith River, the Mayo River, and numerous smaller streams. In North Carolina, most of the Dan River and large sections of other rivers in the basin are impaired due to sedimentation and turbidity; parts are also impaired due to fecal coliform. This is primarily attributed to nonpoint source pollution (North Carolina Department of Environment and Natural Resources, Division of Water Quality, Environmental Sciences Section, 2005). In Virginia, sections of the Dan and Smith Rivers and their tributaries are impaired due to e. coli, fecal coliform, temperature, and benthic macroinvertebrate bioassessments (i.e., monitoring of stream habitats shows that benthic habitats are negatively affected) (Augustine, 2008). In the Virginia section of the Lower Dan, including a segment downstream of Danville, and in the Kerr Reservoir, PCBs have been found in fish tissue.

The four cities included in the study are the largest urban areas in the Dan River Basin. Danville, the largest of the three must comply with NPDES Phase II regulations, which require additional storm water control (Dunevant, 2010). However, Martinsville, Reidsville, and Eden are excluded from these regulations because they pertain to urbanized areas with populations greater than 50,000, and these four cities fall below this threshold. The NPDES Phase II requirements, which are mandated by the federal government under an update to the Clean Water Act in urbanized areas operating municipal separate storm sewers, require Danville to control polluted storm water runoff within its jurisdiction through best management practices (BMPs). The city is also required to meet goals related to public education and outreach, public involvement, detecting and eliminating illicit discharges, controlling construction site runoff and post-construction runoff, and pollution prevention for municipal operations (United States Environmental Protection Agency, Office of Water, 2000, p. 12). Martinsville and Danville have similar erosion control programs required by the state of Virginia, while Eden and Reidsville have water supply watershed ordinances mandated by North Carolina law (*Erosion and Sediment Control*, n.d.; *Erosion and Sediment Control Ordinance*, n.d.; *Water Supply Watershed Protection Ordinance*, n.d.; *Watershed Protection Ordinance*, n.d.). (See Table II for details).

Eden and Danville both use the Dan River as their drinking water supply. Reidsville and Martinsville have reservoirs; Martinsville's reservoir is on a tributary of the Smith River, but Reidsville's water supply is in a different watershed.

Table 1: Drinking water source by city

City	Drinking Water Source
Eden, NC	Dan River
Reidsville, NC	Lake Reidsville (Not a part of the Dan River Basin)
Martinsville, VA	Beaver Creek Reservoir. Supplemental source on Leatherwood Creek. (Both are tributaries of the Smith River).
Danville, VA	Dan River

(Dunkley, 2010; Dyches, 2010; Pearce, 2010; Shelton, 2010; Ward, 2010)

The cities in the basin historically depended on tobacco and textiles, industries that are now fairing poorly (City of Danville, 2001, p. 14) City of Eden, 2007; (City of Martinsville & West Piedmont Planning District Commission, 2008, p. 36). As a result of both increased regulation of these industries as well as the eventual loss of the region's textile plants, some of the basin's most significant sources of pollution have abated: tobacco farming contributed to sedimentation, and textile plants often discharged large amounts of dye that made their way into rivers and drinking water (Dunkley, 2010; Dyches, 2010; Pearce, 2010; Shelton, 2010; Ward, 2010). As these four cities have attempted to reinvigorate their economies, they have each focused on attracting tourism and recreation, in addition to trying to diversify their economies by attracting a wider range of businesses (Adams, 2010; Pearce, 2010; Sgrinia, 2010; Yount, 2010).

The rivers have played a role in tourism development, as they are popular areas for fishing, canoeing, rafting, and hiking (Adams, 2010; Blair, 2010; Cody, 2010; Cross, 2010; Farmer, 2010; Pearce, 2010; Sgrinia, 2010; Stultz, 2010; Yount, 2010). Specifically, Danville is trying to revitalize its downtown riverfront area and improve recreational and pedestrian ties to the river (Blair, 2010; City of Danville, 2001). Their Parks and Recreation Department has attempted to educate the public about water quality issues (Blair, 2010; Cross, 2010). However, opportunities for boating are limited by dams on either side of the city (Dunkley, 2010; Sgrinia, 2010). Eden, which is located at the convergence of the Smith and Dan Rivers, markets itself as "The Land of Two Rivers," holds an annual Riverfest, and has recently completed construction of a greenway along the Smith River, but it also attracts visitors with sports tournaments at a park and is beginning to draw on historic mills as well (Adams, 2010; Farmer, 2010; Stultz, 2010). Reidsville also attempts to attract tourism, but one of its biggest draws, Lake Reidsville, is in a different watershed, the Cape Fear river basin (City of Reidsville, 1990). The streams that traverse the half of the city that is within the Dan River's watershed are not widely promoted or used as sites for recreation (Pearce, 2010; Merritt, 2010). Martinsville has some fishing and boating activities in the small section of the Smith River that passes through the city, but its biggest recreational draws are sports teams and wildlife trails; a natural history museum, an artisan center, and the Martinsville Speedway are also significant attractions (City of Martinsville & West Piedmont Planning District Commission, 2008). However, the Leisure Services Director as well as the Tourism Director both have strong interests in outdoor recreation, and are placing a greater emphasis on activities that involve the river (Cody, 2010).

Theoretical Background

There is a considerable amount of literature that examines the shift from agricultural and industrial values to tourism, recreation, and amenities values, as well as public attitudes, priorities, and values about conservation.

Numerous studies have looked at the economics of water quality as an amenity. Spash, Urama, Burton, Kenyon, Shannon, and Hill (2006) suggested that social psychology and philosophical factors explain people's positions on biodiversity improvement in a water ecosystem better than contingent valuation, and found that many survey respondents' willingness to pay was strongly correlated with their ethical or philosophical positions and social norms. There is also evidence that poor water quality inhibits recreational use of rivers. Tay and McCarthy (1994) looked at how various pollutants in water were correlated with anglers' choices of fishing destinations, and found that all but one of the pollutants they measured reduced the probability of the site being chosen for fishing.

Willingness-to-pay studies and other consumer-focused studies have identified factors that led people to pay for improvements to water quality in streams and rivers. These studies

indicate that members of the public are generally willing to pay for environmental protection, and identify motivating factors such as public health, preserving the environment for future generations, and the intangible benefits to humans of having quality water bodies (Lant and Roberts, 1990). Greenley, Walsh, and Young (1981) identified several sets of nonmarket values that motivate people to pay for water quality protection: option value, the willingness to pay for the opportunity to choose among uses of a resource in the future, existence value, the willingness to pay for the knowledge that a natural resource is being preserved, and bequest value, willingness to pay for the satisfaction of preserving benefits for future generations. They found that, while most households that planned to use a river for recreation were willing to pay for water quality due to option value, around 20% who had no intention of using the river would be willing to pay due to bequest value or existence value.

Research has also looked at how attitudes and values affect people's environmental stances. Soliva and Hunziker (2007), in a study of how landscape preferences correlate with conservation values, found that respondents who prefer forested landscapes are more concerned about conserving landscapes, species, and natural processes than people who prefer cultural landscapes (those showing greater human impacts). Gramlich (1977) looked at willingness to pay for swimmable water in the Charles River in Boston, and found that the aggregate costs of such a cleanup were equal to the benefits that it would produce.

Many of the articles looking at the shift from industrial or agricultural economic bases to more amenity-oriented economies in rural areas focused on conflicts between long-standing residents and newcomers. Generally, these articles assert that long-term residents favored older extractive industries, while in-migrants who were attracted by amenities more strongly favored environmental preservation (Blahna, 1990; Graber, 1974; Green, Marcouiller, Deller, Erkkila, and Sumathi, 1996; McBeth, 1995; Smutny and Takahashi, 1999). However, Fortmann and Kusel (1990) argue that new residents are often simply more vocal in promoting environmental stances shared with long-term residents. While this body of literature might not appear to directly pertain to the Dan River Basin, an area with relatively little in-migration, it does provide an interesting contrast to my research, which will focus on a region where changes in attitudes seem to be happening from within. Areas with slow growth do not seem to be a major focus in the literature; however, these regions still face problems caused by environmental degradation.

In a related vein, there is also literature that purports that rural areas are undergoing a shift from productivism, focus on using nature for extractive purposes, to postproductivism, decrease in production and a greater focus on environmental services and nonmaterial qualities of nature (Mather, 2001; Ilbery & Bowler, 1998; Reed & Gill, 1997). The research along these lines primarily deals with agriculture and forestry. I was not able to find any articles that attempted to apply this theory to water resources, but the notion that economies that were once focused on production are now more dependent on tourism, recreation, and amenities is a useful lens through which to look at planning in the Dan River Basin. Therefore, when interviewing city staff, I paid attention to whether the values ascribed to natural resources are extractive, amenities-based, or both.

CONCEPTUAL STRUCTURE AND METHODOLOGY

Because the study focused on the attitudes and decision-making processes of stakeholders, which can be difficult to quantify, it took a qualitative approach (Colomb, Williams, & Booth; Merriam, 2009; Silverman, 2000). Since the research focused on ongoing events in an attempt to identify causal links, it takes the form of four case studies (Yin, 2009). The limited number of cities included in the study precluded the possibility of gathering

sufficient data to produce a representative sample. Furthermore, in-depth analysis of these four cases was required in order to identify and compare the policies and programs being put into place, and the values and goals behind them. In order to improve the validity of the findings, the research used both interviews and a review of local ordinances as sources of evidence (Yin, 2009).

I initially intended to also analyze each city's comprehensive plan and other relevant planning documents to identify goals and objectives relating to water quality. However, my discussions with planners revealed that the four cities' plans varied greatly in age and applicability. Reidsville's comprehensive plan was developed in 1990, and the city's planning director indicated that many statements in the plan are no longer applicable (Pearce, 2010). In addition, Danville has begun the process of creating a new comprehensive plan (Blair, 2010). Furthermore, Danville's engineer in charge of storm water management said that some of the suggestions in the comprehensive plan, such as the use of regional best management practices (BMPs), were no longer recommended by the state of Virginia. In addition, the plan states that Danville is in the Chesapeake Bay watershed, which is not correct. The storm water engineer suggested that parts of the plan dealing with storm water might have been based on plans from other cities in Virginia, explaining the discrepancies (Dunevant, 2010). Because these plans did not seem to reflect current policies, I focused on interviews rather than the contents of the plans.

The main data source for my analysis is interviews I conducted with planning, parks and recreation, tourism development, and engineering department staff. These interviews allowed me to directly identify the motivations of city leaders, their attitudes and values regarding water quality, and what connections, if any, they saw between environmental goals and development goals. I selected interview subjects by identifying staff in planning, engineering, tourism, or parks and recreation departments in each of the four cities, because these departments would include staff that have been involved in developing tourism, managing outdoor recreation, or overseeing water treatment or storm water for the city. I first tried to contact the director of each department; if the director was not available for an interview, or if he or she thought someone else in the department would be better able to discuss tourism and recreation or water quality in the Dan River Basin, I asked them to recommend someone else to interview. Some of my interview subjects were also people who other interviewees recommended because of their familiarity with the subject matter. The appendix includes a table of interview subjects and their respective roles.

This research provides an overview of what each city is doing to improve tourism and recreation, the degree to which each city prioritizes preserving and restoring the waters of the Dan River Basin, and how these two sets of objectives relate to one another. I also explore city leaders' opinions of environmental regulation, and how this affects the degree to which they create and implement plans, policies, and programs to protect the river basin.

RESULTS

I hypothesized that cities would see economic development and protecting the rivers as a tradeoff, at least to some extent, and that cities with more tourism and recreation development focused on the river would do more to protect water quality due to its effect on the economy. However, neither assumption was confirmed by interviews with staff of the four cities.

I found that staff of all four cities considered water quality important, and saw protecting the environment as intrinsically important. They also agreed that tourism was a growing part of the economy, and that the rivers and lakes were an important part of the tourist economy. In addition, several people said that the effects of recreation and clean drinking on residents' quality of life were more important than their effects on tourism . Also, no one thought there was a significant conflict between economic development and environmental protections.

Nearly everyone I spoke to agreed that protecting water quality was extremely important, and staff in each city agreed that water was one of the most important resources that they had, if not the most important. They also agreed that tourism and recreation made up an important and growing segment of their economies, that rivers and lakes near the city were major sources of recreation (although to varying degrees), and that clean water was important for promoting recreational use of the rivers.

However, nearly everyone agreed that tourism and recreation did not provide a major impetus for protecting water quality. Instead, I heard again and again that each city would protect water quality to the same extent even if their streams and lakes were not used for recreation. Instead, federal and state regulations, providing high quality drinking water, and a belief that environmental protection is inherently beneficial were the main motivations for protecting water quality. Most interview subjects agreed that their cities would not typically make special efforts to improve water quality for the sole or primary purpose of increasing tourism and recreation, nor would they be likely to enact regulations or carry out programs that go far beyond state or federal requirements to improve water quality. Attempts to improve water quality that were beyond state or federal requirements were typically limited to one-time projects contingent on an outside source of funding such as a grant, or incidental to the former presence of industries – i.e., wastewater was typically treated to higher levels than required because the treatment plants were originally built to handle industrial waste but are now treating mostly residential waste(Ward, 2010). None of the cities went far beyond what was required by North Carolina or Virginia state regulations or federal regulations. Furthermore, the abundance of water in this region, as well as the excess capacity in the cities' water and wastewater treatment facilities, were identified as having a greater influence on their ability to attract industry than water quality, which was important but usually secondary to quantity (Blair, 2010; Dunkley, 2010; Dyches, 2010; Pearce, 2010; Stultz, 2010).

Most people I spoke to thought that water quality in the rivers was good and that additional protections were probably not necessary, and that it was difficult to fund changes at the city level without outside assistance or to create or enforce ordinances that would place additional restrictions on residents or businesses (Dunevant, 2010; Dyches, 2010; Pearce, 2010; Stultz, 2010; Ward, 2010). However, no one I spoke to saw any serious negative consequences from environmental regulations meant to protect water quality. Some people

mentioned costs to the city or developers or restrictions on development in watersheds, but no one saw these as major problems (Dunkley, 2010; Dyches, 2010; Pearce, 2010; Ward, 2010,). Many people answered that there were no negative consequences caused by watershed protection, and those who listed the drawbacks above said the benefits outweighed the costs (Blair, 2010; Dunkley, 2010; Sgrinia, 2010; Stultz, 2010; Ward, 2010).

Many people I spoke to expected regulations to become increasingly strict over time. For example, the water resources director in Martinsville thought the city might soon be under Phase II regulations, or that statewide limits on nutrients might be imposed due to limits in the Chesapeake Bay watershed (Dunevant, 2010; Dunkley, 2010; Dyches, 2010; Pearce, 2010; Ward, 2010). However, while there was some concern that it might be difficult for cities to meet new requirements, no one said that they thought increasing regulation would be unreasonable or unnecessary. This is especially interesting in light of the fact that many people though that water quality in the basin was currently very good.

However, even though tourism and recreation did not appear to motivate cities to provide additional levels of protection for water quality, and even though the city employees I spoke to agreed unanimously that water quality was important, their portrayals of how the public reacted to regulations suggested differences between cities in public attitudes. Access to rivers, lakes, and streams seemed to have an impact on the degree to which residents and businesses accepted or resisted regulation. It also influenced the degree to which city staff thought residents identified with or took pride in the rivers.

Many of the interview subjects also spoke of the rivers with fondness and enthusiasm, and often wanted to share stories about their personal experiences involving the river; this was particularly true in Eden and Rockingham County (Adams, 2010; Cody, 2010; Dunkley, 2010; Pearce, 2010; Stultz, 2010; Yount, 2010). This is significant because Soliva and Hunziker's (2009) research suggests that preference for the outdoors over cultural landscapes correlated with stronger conservation values. The favorable attitudes toward environmental regulations expressed by interviewees seemed to be in accordance with these findings. Additionally, personal interests in outdoor recreation and environmental issues seemed to be motivating Martinsville's leisure services director and tourism director to increase the city's promotion of recreational use of the rivers and involvement in promoting riparian buffers (Cody, 2010). This example suggests that even if comprehensive policies aimed at improving water quality may be hard to implement without state or federal encouragement, city government staff with an interest in environmental issues can still encourage environmentally beneficial projects when given the opportunity.

Overview of tourism and recreation by city

The four cities have varying degrees of access to the Dan River and Smith River and opportunities for recreational use of the rivers.

Danville

The portion of the Dan River that passes through Danville offers limited access for boating. Two dams and boulders in part of the river make it infeasible for boaters to pass by the city; instead, there are access points allowing boaters to travel upstream or downstream from the city (Dunkley, 2010; Sgrinia, 2010). The river's steep, sloping mud banks create an additional barrier to recreational use (Sgrinia, 2010, Cross, 2010). Additionally, the section of the river that passes through Danville has high levels of turbidity, which gives it a muddy appearance and detracts from its appeal (Dunkley, 2010; Cross, 2010).

However, Danville is trying to increase access to the river, and Danville's outdoor recreation director described tourism and recreation as a very important and growing part of the economy (Blair, 2010; Sgrinia, 2010). They city has created the Riverwalk trail system, which connects the riverfront to Carrington Pavilion, an outdoor stage which is an important tourist attraction, and to Dan River Crossing, an adaptive reuse apartment complex in a former tobacco warehouse. Carrington Pavilion and two major parks are located on the riverfront. Most visitors to the river use trails or parks beside the river rather than participate in activities such as boating; fishing is the primary recreational use of the river itself (Sgrinia, 2010).

In addition, the Dan River is within a short walk from Danville's downtown, which the city is attempting to revitalize. The Riverwalk trail system has the potential to play some role in the downtown revitalization. According to an associate planner, people who use the Riverwalk for recreation have affected small businesses located nearby. Specifically, the owner of a bicycle store that recently opened says that many of the store's customers are people who bike along the Riverwalk, although some of their business can also be attributed to the recent addition of bike lanes in parts of the city. The planner also mentioned an ice cream shop as typical of businesses that attract customers coming from the Riverwalk. The majority of Riverwalk users are residents, but she described the trail as a "huge asset" for people who come to visit as well, even if they primarily come for other attractions like Carrington Pavilion or the city's science center (Blair, 2010).

Martinsville

While the Dan River runs through downtown Danville, only a short section of the Smith River passes through Martinsville along the city's boundaries (City of Martinsville & West Piedmont Planning District Commission, 2008; Cody, 2010). Henry County and the Dan River Basin Association (DRBA), an organization that focuses on recreation and environmental issues in the basin, promote tourism along this section of the river more than Martinsville does. However, the city often partners with DRBA, the county, and other organizations to promote recreational activities that take place along the river, sometimes outside Martinsville's city limits. The current leisure services director and the current tourism director are both trying to increase opportunities for outdoor recreation, both near the river and elsewhere, something that their predecessors placed less emphasis on (Cody, 2010). The tourism director was previously in charge of trail development for the Dan River Basin Association. One example of this shift is the newly established Smith River Fest, which was created through a partnership between Martinsville, DRBA, Henry County, and Franklin County. The festival takes place in Basset, Virginia. Martinsville also sponsors the Smith River Mini-Triathlon, which includes kayaking on the Smith River and takes place on a trail approximately five miles outside of the city. The parks and recreation department also offers canoe and kayak trips and lessons (Cody, 2010). There are walking trails around part of the river, developed by the county but with involvement from the city. This section of Smith River is known for brown trout, which thrive in the cold water that is released from the Philpott Dam (Cody, 2010; Dyches, 2010). Although there are many recreational activities that are possible on nearby sections of the Smith River, most take place outside the city, limiting how significant a focus it is likely to become for Martinsville (Cody, 2010). However, the Leisure Services Director's and Tourism Director's attempts to promote more recreation involving the river might make it into more of a focal point (Cody, 2010).

Other major outdoor recreation and tourism attractions in Martinsville include the reservoir and a park surrounding it and trails along a former railway line. The Martinsville Mustangs baseball team, a sports complex, a natural history museum, and the Martinsville Speedway racetrack are also important tourism attractions(City of Martinsville & West Piedmont Planning District Commission, 2008; Cody, 2010).

Reidsville

Approximately half of Reidsville is located in the Dan River watershed, and several of the Dan River's tributaries are located there (City of Reidsville, 1990; Pearce, 2010). However, the river itself does not pass through the city, and the tributaries do not play a significant role in tourism and recreation. No one I spoke to was aware of fishing, hiking, or boating being common activities outside of Lake Reidsville, in either the Cape Fear or the Dan River watershed. Lake Reidsville's Park Supervisor reported seeing occasional fishers on a particular stream, and Reidsville's Community Development Director said that some small tributaries may be dammed to make fishing ponds, but no one was able to identify any streams that were commonly used for recreation (Merritt, 2010; Pearce, 2010). The Community Development Director thought most of the streams were too small to be heavily used for fishing. In addition, although Reidsville has two greenways, neither is in the Dan River Basin (Pearce, 2010).

Instead, Lake Reidsville is the focal point of outdoor recreation in Reidsville (Merritt, 2010; Pearce, 2010). It is used for boating, water skiing, and wakeboarding. However, its primary purpose is to supply drinking water, so swimming and jet skis are not allowed, and fishing from the bank is limited to a designated part of the park at Lake Reidsville in order to protect the water supply from contamination. Bass fishing is popular in the lake, and fishing tournaments draw tourists from other parts of North Carolina as well as from out of state. Hunting, a pro disc golf tournament, and camping areas at the lake also attract out of state tourists. Reidsville's Parks and Recreation Department receives a grant from the Rockingham County Partnership for Community Development to market tourism at Lake Reidsville (Merritt, 2010). Lake Reidsville's Park Supervisor thought that tourists visiting the lake brought business to local restaurants and hotels, as did the Community Development Director (Merritt, 2010).

The Community Development Director saw tourism as an important and growing part of Reidsville's economy. He said that the city markets Lake Reidsville especially heavily, with billboards, advertisements targeting people attending NASCAR races in Martinsville, and in magazines and other publications. He considered the lake and the bass fishing available there the city's primary attractions, in addition to Market Square, a farmers market and stage area in the city's downtown. The city is also partnering with Rockingham County to build a large equestrian center (Pearce, 2010).

Eden

Reidsville and Eden are both located in Rockingham County, which has an active tourism development department. The two cities and the county recently took out an advertisement promoting activities involving the Dan and Smith Rivers and Lake Reidsville in Our State, a magazine focused on North Carolina tourism (Adams, 2010; Yount, 2010).

The sections of the Dan River and Smith River that converge in Eden are suitable for a wide range of recreational uses. There are shallow areas with calm water and rapids in other areas, making different sections suitable for kayakers and canoe users at different skill levels. In addition, these segments of the rivers are used for fishing, tubing, and hiking (Adams,

2010). A large stream, Matrimony Creek, also flows into the Smith River in Eden (Stultz, 2010).

Eden seems to have the strongest recreational ties to the Dan River Bain of the four cities examined here. The city has developed three river access points along the Smith and Dan Rivers. Additionally, in 2007 the city council spent 1.2 million dollars of a 10 million dollar general fund budget to build a greenway, which connects to the city's YMCA. The 1.7-mile trail along the Dan River was constructed on 25 acres of property purchased by the city. Eden has also created a greenway master plan that calls for a total of 43 miles of trails to be constructed in the future (Adams, 2010; Stultz, 2010). Eden's planning director emphasized the city's investment in tourism: "We've done pretty well with limited resources. Eden, like many other textile towns, has truly suffered in the last few years, and so we've been really lucky to get any of these things done. The tourism focus has been a big one" (Stultz, 2010).

Eden's planning director, tourism director, and parks and recreation director had similar thoughts on the importance of the rivers relative to other tourist attractions. According to Eden's parks and recreation director, parks and recreation played a significant role in tourism and economic development. The rivers are important to the Eden's parks system, but Freedom Park, the city's largest park, and sports tournaments also had a significant economic role(Farmer, 2010). Similarly, Eden's Coordinator of Tourism and Special Events and the Planning and Inspections Director were not certain that the rivers were the biggest attraction for tourism. She said that tournaments and events in the city's main park, tours of businesses such as a rug manufacturer and the Miller Brewery, and NASCAR races in Martinsville also brought tourists to Eden (Adams, 2010). Generally, there are fewer formal programs around the rivers than there are around other areas of parks and recreation, such as Freedom Park's sports events (Farmer, 2010).

However, despite the other sources of tourism in the town, the two rivers play a large role. Eden's Coordinator of Tourism and Special Events describes the rivers as the city's "centerpiece of tourism" (Adams, 2010) She reported that one of the city's outfitters had 800 paying customers, most of them from outside the county, during the previous year. Eden hosts an annual festival called Riverfest, which focuses on the rivers as well as the arts and Eden's history. She said the festival attracts approximately 17,000 people each year and has an economic impact of a little over 1.2 million dollars in a single weekend, making it a major contributor to economic development (Adams, 2010).

The City of Eden's staff seemed more convinced than staff in other cities that the rivers directly affect tourism in the region. The Planning and Inspections Director said, "There is a real spirit of rejuvenation here, and I think [the Coordinator of Tourism and Special Events'] work with the rivers is going to be a huge part of that" (Stultz, 2010). She also said that older residents tended to identify the city with its rivers. However, there was a period of time where this identification became less strong, because access to the rivers had been reduced. She thought that a sense of identification with the rivers, as well as a feeling of pride in them, was increasing again (Stultz, 2010). The Coordinator of Tourism and Special Events added that many new residents who have moved to Eden from elsewhere also identify with the rivers (Adams, 2010). She elaborated, "My dad says, 'I grew up in that river,' and they literally did. The river was a big source of recreation" (Adams, 2010). Similarly, the Planning and Inspections Director described how previous generations often swam and fished in the rivers, and said of fish her father would catch: "Little did we know, we were eating them out of the

Smith River, and at this point that might not have been safe. But, now those things are no problem, and the wildlife in the rivers is having a real rejuvenation" (Stultz, 2010).

The Director of Parks and Recreation also indicated that Eden's residents have a long history of using the rivers recreationally:

> I think the rivers have always been a very used resource in the city of Eden. Even before we had canoe access, back in the 60s and 70s, people would fish along the rivers; they'd get on the rivers and canoe, and things like that. I think with the added access points it just makes it a lot easier for people to use the rivers. And I think that they use them because they know that the rivers are very accessible and they know that they are maintained really well (Farmer, 2010).

The interview subjects suggested that Eden's residents had particularly strong ties to the river and that recreation involving the river has been important to residents for years.

WATER QUALITY AND RECREATION/TOURISM

Interviews revealed that good water quality made recreational use of rivers and lakes in the Dan River Basin possible. However, most people I interviewed said that tourism development did not motivate their cities to protect water quality. Rather, state and federal regulation and the need for clean drinking water determined policies, and the benefits to recreation were a fortunate side effect.

Danville

Danville's director of parks, recreation, and tourism said that he does not know whether there is any relationship between the use of the river for recreation and attempts to improve water quality; he thought that there has been a heightened interest in and awareness of environmental regulations regardless of whether this change was related to tourism and recreation (Sgrinia, 2010). Danville's outdoor recreation director contrasted the appearance of the Dan River with its actual health, and implied that appearance might impact recreational use more than actual health risks. The section of the Dan River that passes by Danville suffers from turbidity, earning it the nickname "the Muddy Dan." She said that the appearance has an affect on people's response to the Dan River that varies depending on where they are from. People who come to Danville from mountain areas where the water is very clear take a while to get used to the muddy appearance of the water. She described the reaction of a man who moved to Danville and initially disliked the river; however, he grew to love fishing in the river once he became accustomed to the appearance (Cross, 2010).

Unfortunately, the outdoor recreation director said that the city is not able to remediate the turbidity. The city researched the problem at the request of the Commonwealth, and they discovered that it is caused by siltation that had built up over the years from farming. Although the river is rocky under the silt, silt had covered the rocks and built up along the sides of the river. Farming practices have since changed to reduce erosion, but the silt that has already been deposited is slow to work its way through the river (Cross, 2010).

Water quality issues affecting fishing are minimal in the Dan River. The outdoor recreation director said that she did not know if recreational use of the river had been affected by the loss of textile industries. Although these industries were once known for discharging dyes that changed the color of the river, she thought that water quality improvements were mostly due to the Clean Water Act. She also expressed the opinion that people's attitudes have changed toward the river; this is mostly due to increased access, making the river available for people to use (Adams, 2010).

I asked Danville's Director of Department of Parks, Recreation, and Tourism whether he thought that tourism and recreation would be focused around the river. He answered, "I think as Danville redevelops itself as a more modern city. It's rooted in an industrial past that didn't take advantage of it; the river was a sewer. I think as we redevelop the city, in the future, you'll see the city turn around and face the river and take advantage of it. To answer your question, yes" (Sgrinia, 2010). However, he thought that water quality has little effect on current use. He explained that right now, the river is primarily a "visual sense feature" rather than "interactive" (Sgrinia, 2010). Similarly, the Public Works Project Engineer said that water quality did not currently have much of an effect on tourism in Danville. However, he pointed out that there are impaired waters within the city, and the Virginia Department of Environmental Quality is in the process of creating a TMDL, which will require the city to take additional steps to clean up the water and could have effects on its use in the future (Dunevant, 2010).

Danville's Outdoor Recreation Director discussed how residents' recreational use of the river might affect environmental attitudes. She said that interest in the recreational aspect of the river had definitely increased; environmental interests might have increased. There is a student environmental group at the high school, and larger groups who turn out to help with cleanups of the river. There is also an educational program being used in Danville's schools using the Enviroscape model, which shows students how runoff occurs. However, she said she does not get calls from people concerned about water quality in the river (Cross, 2010).

On the other hand, residents are very interested in the Riverwalk Trail. According to an Associate Planner in Danville, "If there is an issue on the Riverwalk trail, we hear about it quickly. They are active. And it's a broad range. It's family members out with their kids, it's elderly, people in wheelchairs, It's a broad spectrum of people that are out there. We have some that go out just to feed the ducks. That's their daily routine. They're very active." However, the planner thought that residents and outsiders do not currently identify Danville very strongly with the river, although that may change in the future. She said that the city was historically identified with Dan River Mills and tobacco, but that the city is in a "huge transition stage" (Blair, 2010).

Reidsville

Regarding the relationship between recreation and water quality in Reidsville, NC, the Community Development Director explained that, while tourism development is important to Reidsville, it is not what encourages the city to protect water quality:

> Regardless of whether we had any recreational activities, the quality of Lake Reidsville was going to be protected as much as we can. Lake Reidsville, our water down there, is probably the most

> valuable resource we have and will continue to be that. We're just very blessed to have that. We've got Lake Reidsville and Lake Hunt, and during all the recent droughts that we've had, we never suffered one bit. We've never had to cut back on water use. We were selling water to Greensboro just as fast as we could. So, from our standpoint, Lake Reidsville is an enormously important financial asset to us. It's not only a natural resource, but it's money in the bank, so we're going to protect that as much as we can. Now the fact that we can use it, and it has bass fishing, is just gravy. We're going to protect it to the same amount as if it weren't used at all for this stuff (Pearce, 2010).

Lake Reidsville's Park Supervisor also did not think that water quality currently affected recreation. However, if water quality problems arose, the park at Lake Reidsville would have to limit the types of activities that are allowed in the lake. This situation has not occurred during his time on the job, because water quality on the lake is generally very good. High levels of bacteria could potentially affect the fish population, but a biologist recently studied the bass population and found that it was very healthy. In addition, there are not large enough crowds for tourism to cause any harm to water quality on the lake (Merritt, 2010).

Reidsville's first priority for the lake is as a drinking water source; recreation and the sale of water to other cities are secondary. The Lake Reidsville Park Supervisor emphasized that the city would never limit withdrawals to avoid interfering with boating. In addition, recreational use of the lake and surround park is primarily for the benefit of residents, and secondarily for tourists. The park's comprehensive plan is based on input from local residents regarding their recreational demands, rather than what the city thinks will attract tourism. Nonetheless, the lake does pull in visitors from outside Reidsville. Most visitors come from within Rockingham County or from the Triad area (Greensboro, Winston-Salem, and High Point). The bass tournament is the lake's biggest draw (Merritt, 2010).

Discussions with the Lake Reidsville Park Supervisor and the Community Development Director indicated that Reidsville's residents might not be very aware that part of the city is in the Dan River's watershed (Merritt, 2010, Pearce, 2010). At the same time, the Community Development Director said that residents of Reidsville frequently visit the Dan River for recreation, and that they appreciate its proximity. He described Rockingham County as "blessed" to have the Dan and Smith Rivers (Pearce, 2010).

Eden

Eden's parks and recreation director also thought that tourism was not likely to affect the city's actions to protect water quality. Rather, measures taken to protect water quality reflect broader goals, and tourism is a secondary benefit:

> I think the city protects water quality whether it's tourism related or not, because I think it's something we just have to do, because water is the driving backbone of a community, and you've got to have water for drinking, you've got to have water for industry. So I

> think water quality is important whether we were tourism-related or not. I think it's something we try to strive very hard to maintain. … I think water quality in general plays a part in the operations of the city in general. If your water quality's not good, I'm not sure someone's going to relocate to a city. They want to make sure they have a viable drinking source as well as a viable recreation area. If someone wants to get into a river they want to make sure the water is maintained at an adequate level (Farmer, 2010).

He said that people do not call his department and complain about water quality issues. However, he also said that he routinely checks the rivers and that the appearance of the water is clean. Volunteers and city staff have periodic cleanups to remove trash and debris; he indicated that maintaining the appearance of boat ramps and access points was an important consideration for the city (Farmer, 2010). This reflects the emphasis that interviewees often placed on the appearance of the rivers and the affect that this has on recreation.

While most people stated that recreation had not been taken into account when making decisions about water quality, Eden's wastewater superintendent seemed to contradict this, saying that other rivers in North Carolina did not have color limits. She said that regulations limiting dye, although they were imposed by the state rather than the city, might have been due to the river's status as a trout stream (Ward, 2010).

Martinsville

In Martinsville, the Water Resources Director discussed how past problems with dye in the water affected recreation. He said that when dye had been visible in the Smith River, people were reluctant to swim or fish in the river. "It wasn't really so much a health issue, it was an aesthetic thing," he said (Dyches, 2010); this is another example of how the appearance of the river can affect its recreational use, even where there are no health risks.

Martinsville's leisure services director said that part of his motivation to encourage more riparian buffers along the river was to make the river more marketable for recreational use (Cody, 2010). this is the only example I was able to identify of a city making an effort to improve water quality with recreation as a significant motivation.

Water quality and recreation/tourism - summary

Most interview subjects agreed that while recreation and tourism benefit from good water quality, they did not think it was an important motivation for their city's policies on water quality. Protecting the drinking water supply and complying with state requirements had more of an impact on the city's level of water quality protections. There were some exceptions, such as the parks director's involvement in riparian buffers in Martinsville, or Eden's wastewater superintendent's opinion that the state's dye limits had been because of trout fishing. However, in the second example the limits came from the state rather than the city. In addition, several people thought that the appearance of the water, such as color, turbidity, or litter and debris did have an affect on recreational use, even when they did not pose a health risk.

WATER SUPPLY AND ECONOMIC DEVELOPMENT

In addition to their role in tourism, the rivers have historically influenced economic development in the region. Textile mills were especially dependent on the river; their heavy water use made it necessary for them to locate in a region with a large and steady supply of water (City of Danville, 2001; City of Eden, 2007; City of Martinsville & West Piedmont Planning District Commission, 2008; City of Reidsville, 1990; Stultz, 2010). The textile industry has been disappearing, but the continuing abundance of water, as well as the large water and wastewater treatment plants that are now operating well under capacity, could allow other water using industries to locate in the region (Dunkley, 2010; Dyches, 2010; Pearce, 2010; Shelton, 2010; Ward, 2010). Several people interviewed said they would like for a large water user to locate in their city, not only to supply much-needed employment and tax revenue but also to purchase water (Dyches, 2010; Pearce, 2010; Stultz, 2010; Ward, 2010). The sale of water is an important revenue source for Reidsville in particular, and the underutilized treatment facilities are expensive and inefficient to operate (Pearce, 2010). However, several people suggested a role for the rivers in economic development distinct from providing water as an industrial resource. They argued that recreational opportunities, good tasting drinking water, and the fact that water conservation during droughts has rarely been necessary contribute to the quality of life for residents. This, in turn, can attract firms interested in a location that will benefit their workers (Blair, 2010; Dunkley, 2010; Stultz, 2010).

Danville

According to Danville's Public Works Project Engineer in charge of storm water, water quality does not currently affect Danville's economy, but it might if there were an urgent need or highly publicized problem with water quality. Water quality also does not currently affect downtown revitalization, but it might if there were a serious and well-publicized impairment (Dunevant). He also stated that he does not think that the city of Danville considers water quality when trying to attract sources of economic development. He discussed a large shopping center that was recently constructed:

> All the legwork to attract the shopping center was done upfront by Economic Development. When the Developer sent their plans in to the City for review and approval, the plans did not address any water quality requirements or detention requirements for stormwater. The design engineer for the project had not contacted me about what was required for stormwater management before doing his design. The developed shopping center proposed that stormwater would discharge directly from the site into Sandy Creek. My plan review comments indicated the stormwater management requirements that the site would have to meet before the plans could be approved. The developer did not want to do the stormwater management because they already had invested a lot of time is the design and the stormwater management would cost money to implement and would use up some of their land area. The Developer tried to get the regulations and requirements waived for this project but was not successful. So, to answer your question, initial questions about stormwater management probably

> never come up when Economic Development is talking to businesses about locating in Danville. The reason is that its probably more of a technical issue for an engineer to sort through during the design. Five years from now, it may be different because I think that one of our biggest assets is the river and clean water is becoming more of an issue across the nation. I think the Dan River is marketed as an asset when the City is trying to attract businesses here, but I'm not sure the water quality part plays into the discussion at this time. Of course, I'm not usually in on conversations that Economic Development has with potential businesses or developers. My role comes into play more during the design process or when actual plans are submitted (Dunevant, 2010).

One of Danville's associate planners expressed a different point of view. She said that water quality does effect economic development because of the effect it has on quality of life. However, she thought that access to the river more than water quality will affect downtown revitalization. The Riverwalk has spurred the development of businesses such as an ice cream shop and a bicycle shop, which cater to people using the trails. She also thought water supply was one of the city's strengths, and she did not think providing enough water would be a problem for Danville (Blair, 2010).

Martinsville

Martinsville's Water Resources Director said that the city's large water supply has been a selling point for attracting industries. According to him, "With the loss of the textile industries we have adequate supply, and you can spread the word that we have excess water supply here compared to a lot of places. We don't push too much conservation. We need to sell water" (Dyches, 2010). In addition to its large water supply, the surrounding county has two decommissioned wastewater treatment plants. He said that in particular, the city would like industries that are as clean as possible, although if a more problematic industry arrived, "we [would] just have to deal with them if anything came along" (2010).

Reidsville

Reidsville's Community Development Director did not think the Dan River watershed had a significant effect on the city. By contrast, the sale of water from Lake Reidsville to Greensboro is a major source of revenue for Reidsville. According to the Community Development Director, Reidsville would be interested in attracting an industry that is a heavy water user because of the city's large water supply and the revenue that the sale of water could bring. He said that water quality is "something that's extremely important to the sale of water. The recreational use of water is important but the sale of water is that much more important" (Pearce, 2010). Reidsville recently courted a Google facility, which was interested in the area partly because of its need for six million gallons of water per day for refrigeration. Reidsville considered the facility desirable because of the capital investment it would have brought to the city, the potential for high volumes of water sales, and the fact that it would not have contributed to water pollution (Pearce, 2010).

Eden

Eden's wastewater treatment plant superintendent agreed that extra capacity in wastewater treatment plants and water treatment plants is a big draw. However, she also said that Eden is competing with many other cities in similar situations (Ward, 2010).

Eden's Planning and Inspections Director emphasized the long history of Eden's economic relationship with the rivers, and the efforts that were made to make the water usable:

> It's why Governor Morehead came here and channeled the Smith River through the mill down there [the Spray Water Power and Land Company], because of the force of the water, and textiles flourished here because of the plentiful water. Miller Brewing Company came here when I was in high school because of the plentiful water…it had to do with water quality. At that time, the Smith River quality was so bad because Martinsville was still putting raw sewage into it. We had to build special piping to get water out of the Dan. As of just a few years ago, the Smith and the Dan are of equal cleanliness… These rivers are extremely important to us with the community's history and its future (Stultz, 2010).

She also said, "Those rivers are going to be a big part of our future, I think" (Stultz, 2010). She explained that Eden had twice come close to recruiting a large computer company that needed a large water supply for refrigeration, thanks to the extra capacity in the water and wastewater plants. She also saw protecting water quality as a higher priority than the interests of individual industries that use the water. She discussed how the city and state dealt with past problems with discharges of dye into the water by textile industries:

> So, that's really how it was dealt with, color and chemical removal. Ordinances were beefed up, the code was changed, lawsuits happened, and so we do have the ability as a city to charge for those things. There's pretreatment required for some industries, and others, we have the ability to inspect them, see what they're putting out, check their effluent before it starts coming to us. If you play, you pay. If you make it, you pay for it. Or if you violate that, the state will take fines, or we'll shut you down. Those kinds of things. Certainly, nobody likes to shut an industry down, but for the sake of the river and the health of people, sometimes it has had to be done (Ward, 2010).

Water supply and economic development – Conclusion

These comments reveal that the large water supply existing in the basin is a significant economic resource for each of the cities. The quantity was emphasized more often than the

quality of the water; interview subjects peppered their discussions with words like "plentiful" and "abundant" when describing the waters. However, water quality was also seen as crucial, and something that was an asset rather than a burden in terms of economic development (Blair, 2010; Dunkley, 2010; Dyches, 2010; Pearce, 2010; Stultz, 2010). While interview subjects expressed preference for non-polluting industries, some were willing to accept more problematic industries, and they felt confident that they could handle the wastes that would be produced. This revealed there might be some degree of willingness to accept a tradeoff between ideal water quality conditions and economic development, although most interview subjects seemed to think that protecting water quality to allow the development of businesses that are heavy water users, or to protect the city's water supply, were crucial.

OPINIONS REGARDING ENVIRONMENTAL REGULATION

The city staff that I spoke to generally had positive opinions of environmental regulations. Most did not feel that the requirements they were required to meet were excessive, and they nearly all agreed that the benefits outweighed the costs. The main concerns expressed were that environmental regulations could place demands on cities that they might not have the resources to meet.

Danville

In Danville, the Director of Water and Wastewater said that the only negative impact he could think of was the restriction on land use around a drinking water source, but that such restrictions were "just common sense"(Dunkley, 2010). One of Danville's Associate Planners also said that she has not noticed any negative effects resulting from water quality regulations (Blair, 2010). However, the Public Works Project Engineer thought that water quality regulations have negative impacts because they require more upfront work by developers, long-term management of BMPs, and additional land consumption by BMPs, which adds costs. However, he felt that the benefits outweigh the costs, especially since BMPs that are well incorporated into the landscape can be an amenity. He said it was difficult to convince developers around Danville to comply, because they saw such requirements as a way for the city to get more money out of them. He thought that developers in other parts of the state where restrictions have been in place longer had a better understanding of the benefits that BMPs can provide. The engineer also thought that the benefits of regulating storm water discharges outweighed the cost. He argued that even though developers complained about being required to install storm water facilities, BMPs that are well designed could be an amenity (Dunevant).

The Public Works Project Engineer did not think that Danville would be willing to enact regulations beyond those required by the state or federal government. He explained,

> A lot of what we do with regards to storm water management is because we are required by state and federal law to do it. I think you would find that to be the case in many localities. If the state didn't say we had to have water quality BMPs for certain developments, then it's very unlikely that the city would have a law, a code, that would, in effect, make people do it, because

> developers and property owners already complain about having to implement these measures. Right now, we respond to the complaints by saying its state and federal regulations, and that they are welcomed to discuss the regulations with the appropriate agencies. We have to require storm water management because of our status as a Phase II community. If it wasn't required by state or federal law, we probably wouldn't be doing it to the extent that we are now. However, with all of this being said, attitudes have changed in last several years as businesses and developers begin to understand the regulations and why they are in place." (Dunevant, 2010).

The Virginia Division of Environmental Quality is currently establishing TMDLs to deal with PCB impairments in part of the Dan River downstream from Danville. The Public Works Project Engineer thought this would result in changes in Danville. "Once they get through that process, we're going to be imposed with some more restrictions and regulations, and then we'll be doing more. But until that point, I don't see us doing any more than what we're doing right now" (Dunavent, 2010).

Reidsville

Reidsville's Community Development Director was not sure whether water quality standards have any negative effects on Reidsville's economy. He thought the larger riparian buffers required under the Jordan Lake Rules might hamper development, but he was not sure to what degree. (These rules would affect the half of the city that is in Jordan Lake's watershed, but not the part that is in the Dan River Basin. They are not yet being implemented.) He was also concerned the new rules would affect the development of the city's industrial park, which the city has invested in heavily and which is still not built out. He said that the city would love to see clean industries locate there, largely because of the negative effect that pollution could have on the quality of life of residents. However, he said that with an unemployment rate of at least 11%, the city's residents would happily accept an industry that did not cause pollution, but which might have negative aesthetic impacts such as an offensive odor. Despite the city's willingness to tolerate nuisances from an industry, he said that an industry's impacts on water would be an important consideration. When asked what effect environmental protections had on the city, he said they were primarily beneficial in the long run. "When you enact those things it can get adversarial, things with property owners and people who'd like to develop their property, but in the long run we just have to do that. We've got to protect Lake Reidsville" (Pearce, 2010).

I also asked whether he thought the Dan River Basin had much of an impact on the city, compared to the Cape Fear Basin and the Lake Reidsville watershed. He answered, "No, it really hasn't. The Roanoke River Basin and the Dan River haven't had much of an impact. It's quite a distance. We don't have major tributaries going in that direction. We've got Wolf Island Creek that I guess flows in that direction. … It sounds like I'm not in favor of protecting the Dan River, like we don't care – but we just don't have any pressure on us to provide any more protection than we do now, not like we do with the Cape Fear River Basin." He clarified, "of course we do care about protecting all water resources that are in and around Reidsville, regardless of their final destination. Obviously, though in the past few years the regulatory focus has been on the waters that flow to Jordan Lake, which happen to be in the Cape Fear

River Basin. So, we will have in effect stricter standards on the waters that flow to the Haw River in the southern half of the City, than we do on the waters that flow to the Dan River in the northern half of the City."

However, he also expressed the fondness that Reidsville's residents feel for the Dan River.

> Rockingham County in general is very blessed to have the Dan River going all around all over the county ... I think we enjoy the Dan a whole lot. In fact, Reidsville's probably jealous that Eden has the Dan River, because that's a pretty cool thing as far as greenways and recreational opportunities. Lake Reidsville is a great place to be, but a river has its own charm that a lake doesn't (Pearce, 2010).

Martinsville

The Water Resources Director said that Martinsville's wastewater treatment plant, built to handle textile wastes rather than its current load from residential users, is not economical to operate because of its high electrical costs. However, he was proud that Martinsville developed an effective, economical dye removal process using polymers during the 1980's and 1990's, making Martinsville the "guinea pig" for dye removal technology and attracting interested visitors from as far away as Australia (Dyches, 2010).

Eden

The Superintendent of Wastewater Plants described the difficulty of trying to keep Eden's wastewater treatment plant up to date. The city is trying to replace old collection lines and wastewater treatment plant equipment, but it does not have the money to make the repairs. Part of the problem is that the plant has lost revenue from industries that used to be in the city, but still must maintain the infrastructure. The city successfully applied for a grant last year to help pay for the upgrades, but the state cut the grant program. The superintendent was concerned that an upcoming review might result in even higher standards expected of the plant, and she stated that wastewater treatment is "a high pressure business right now. As far as what's going out into the river, it's probably better off than what is in the river itself. Many of our limits are even stricter than those of drinking water, so I think that we're doing all that we can" (Ward, 2010).

The Planning and Inspections Director said of adopting Eden's watershed ordinance when it became required by the state: "so far we have not really seen any negatives from it. Most of our watersheds, particularly protected areas in both, are primarily built out, so we have not really had any battles with anybody about the regulations, and we're a WS4 because it's not a contained water supply, so the regulations are not as strict" (Stultz, 2010). She described the initial reaction the watershed ordinance as negative because of a "protectionist" attitude toward property (Stultz, 2010). However, people quickly accepted the new rules. The Planning and Inspections Director said that only one person has ever asked to have a study done to have their property removed from the watershed. She also said that no one has ever applied for the 10/70 option, which allows denser development that what is normally allowed in the watershed

(Stultz, 2010). When asked whether water quality regulations had a positive or negative impact on the city, she answered, "I'm sure it's absolutely been a good thing for the city. The one thing we have that other communities don't – we don't have a major roadway, we don't have an interstate, we're not at the beach or the mountains – the one thing that makes us special is a plentiful, clean water supply. And, we have to guard that even more zealously than other communities because it is the most important thing we have" (Stultz, 2010). More broadly, she said, "I think, for the future not just of Eden, but of the of the world, we have to have environmental regulations" (Stultz, 2010). Later, she said, "I think communities have a moral obligation to protect their environment. And that puts it back on the staff" (Stultz, 2010). The Planning and Inspections Director attributed many of the improvements in the Smith River to Eden's water and wastewater staff (Stultz, 2010). The Coordinator of Tourism and Special Events expressed similar sentiments, saying that the perception of the community and its stewardship of the waters is a reason to protect water quality. "We label those rivers our jewels, so they're very important," she added (Adams, 2010).

Attitudes regarding environmental regulations - conclusion

The interview subjects generally had a positive attitude towards environmental regulations, seeing them as necessary and beneficial. Although there was some concern that increasing regulations might impose new costs on the cities, interview subjects accepted this and did not see the regulations as unreasonable. Some people said that complaints from residents or developers about limits on land use were a problem. The degree to which residents were bothered by requirements seemed to vary from city to city. For example, people in Danville seemed to be less willing to accept restrictions than people in Eden. However, this is based on the opinions of government staff rather than residents themselves and might not be accurate. Also, the variations between cities could be due to differences in development pressures among the cities, or due to the fact that Danville's Phase II status means residents must comply with regulations that are stricter than those in other cities, and which have not been in place for as long.

ACTIONS TAKEN TO PROTECT WATER QUALITY

State and federal requirements

The level of regulation and policy protecting water quality required under each city's code is roughly similar between Danville and Martinsville, and between Reidsville and Eden. Regulations are based primarily on state law, and differences seem to mostly come from differences in North Carolina and Virginia law (*Building and Development Regulations, Article V. Stormwater Management*, n.d.; *Erosion and Sediment Control*, n.d.; *Erosion and Sediment Control Ordinance*, n.d.; *Health, Sanitation, and Nuisances Ordinance*, n.d.; *Water Supply Watershed Protection Ordinance*, n.d.; *Watershed Protection Ordinance*, n.d.). Reidsville has slightly stricter regulations on development around Lake Reidsville than Eden has around the Dan River. However, this is due to the fact that reservoirs require stricter controls than rivers for drinking water as a general rule, rather than any difference in policy at the local level (Stultz, 2010; *Water Supply Watershed Protection Ordinance*, n.d.; *Watershed Protection Ordinance*, n.d.). Reidsville will be affected by new regulations intended to protect the Jordan Lake watershed. However, this is simply due to its location in the watershed, and the regulations will not impact the part of the city that is in the Dan River watershed (Pearce,

2010). Danville and Martinsville have similar storm water regulations, which comply with Virginia storm water regulations (*Building and Development Regulations, Article V. Stormwater Management*, n.d.; *Erosion and Sediment Control*, n.d.; *Erosion and Sediment Control Ordinance*, n.d.). Danville is under NPDES Phase II requirements (Dunevant, 2010). These requirements, which are mandated by the federal government under an update to the Clean Water Act for urbanized areas operating municipal separate storm sewers, require Danville to control polluted storm water runoff within its jurisdiction through best management practices (BMPs). The city is also required to meet goals related to public education and outreach, public involvement, detecting and eliminating illicit discharges, controlling construction site runoff and post-construction runoff, and pollution prevention for municipal operations. Martinsville, Reidsville, and Eden do not fall under these regulations because they pertain to urbanized areas with populations greater than 50,000 (United States Environmental Protection Agency, Office of Water, 2000, p. 12). In summary, legal controls on water quality seem to be driven by state and federal requirements. Interview subjects agreed that their cities would not be likely to try to create enforce additional regulations beyond what is required of them. However, they have taken some proactive steps, usually when they have been able to receive outside funding to carry out a specific project.

The following table (Table 2) summarizes ordinances protecting water quality in each city.

Table 2: Ordinances affecting water quality in Eden, NC, Reidsville, NC, Martinsville, VA, and Danville, VA

	Ordinance	Description	Notes
Danville	Erosion and Sediment Control	Article 1: The purpose is to conform to section 10.1-561(A) of the Code of Virginia, 1950, as amended, which provides for a comprehensive program throughout the Commonwealth to control erosion and sedimentation, which is implemented at the local level. The city's erosion and sediment control plan is based on the VA Erosion and Sediment Control Regulations (VR 625-02-00). The law authorizes a monitoring program, which is currently not very active due to insufficient staff, although the city intends to increase inspections in the near future.	Virginia's Erosion & Sediment Control Handbook focuses on construction as a source of sediment pollution, but also addresses post-development storm water considerations. Principles include: Fitting development to soil type, topography, drainage patterns, and vegetation; minimizing exposed area; use erosion control to minimize on-site damage; apply perimeter control practices to prevent runoff; minimize velocity and retain runoff on-site; stabilize disturbed areas; implement a maintenance and follow-up program.
		Article 2: Any land disturbing activities (clearing, filling, excavating, grading, or transporting land) require a permit and erosion and sediment control plan based on the Virginia Erosion and Sediment Control Handbook. The plan must address disposal and storage of toxic chemicals and a spill prevention plan. The program administrator may designate an erosion impact area and require a conservation plan. A conservation agreement may be made in lieu of a plan in the case of single-family residences.	
	Building and Development Regulations, Storm water Management	Requires permit to install, alter, repair, or replace a storm water or drainage system or facility. Storm water drainage systems installed by the city shall be maintained by the city to minimize damage to surrounding property. The City Engineer may require a site plan, a topographical map of the watershed where the site is located, and information related to the development that may affect the required dimensions/materials of the drainage system. Property owners may not obstruct a natural watercourse in such a way that it causes a nuisance, menace to public health or safety. Division 7. Urban Storm water Quality Management and Discharge Control focuses on protecting water in compliance with the Federal Clean Water Act.	
Martinsville	Erosion and Sediment Control	"The purpose of this chapter is to conserve the land, water, air and other natural resources of the city and promote the public health and welfare of the people in the city…" Any land disturbing activities require an erosion and sediment control plan based on the Virginia Erosion and Sediment Control Handbook and a permit. A building official oversees the erosion and sediment control program and may inspect sites; the official may also designate an erosion impact area and require a conservation plan. The ordinance references similar provisions in the Code of Virginia, § 21-89.6.	Martins ville's sediment control ordinance is slightly more explicit than Danville's in expressing the environmental goals behind the regulations.

Ordinance		Description	Notes
Eden	Health, Sanitation and Nuisances	May not block the natural flow of waterways if obstructions create flood conditions.	
	Watershed Protection	A watershed protection permit must be issued as a prerequisite to a building permit. Subdivision applications for properties within the watershed must be filed with the Watershed Administrator to confirm it complies with the ordinance. Drainage system must incorporate BMPs and divert storm water runoff away from surface waters. Roads should be located outside critical watershed when possible. In both the watershed's protected area and critical area, residential development is limited to 2 units per acre and a maximum of 24% built-upon area. May be up to 36% built-upon in protected area if development does not have a curb-and-gutter street system. Allows cluster development. Requires a 30-foot vegetative buffer along perennial waters. Development may be developed under the 10/70 provisions, which allow 10% of acreage designated as protected for the Dan and Smith River Watersheds to be developed with up to 70% built-upon area, approved on a project-by-project basis (According to the planning director, no applications for the 10/70 option have been submitted since the enactment of the ordinance in 1993).	Established in compliance with 143-214.5, 160A-371 and 160A-381 of the North Carolina General Statutes, which delegated the responsibility and authority to local governments to establish water supply watershed protection programs, to regulate land use and development within water supply watersheds and to adopt regulations designed to promote the public health, safety and general welfare of its citizenry. Eden's regulations are less restrictive because their drinking water supply is not contained.
Reidsville	Water Supply Watershed Protection	A watershed protection permit must be issued as a prerequisite to a building permit. Approval based on a point system that considers impervious surface, soil types, drainageway conditions, slope, undisturbed area, public sewer system, proximity to waterway, and storm water management structures, and erosion control measures. Establishes a Watershed Protection Overlay District for water supply watersheds, which limits residential density to 2 units per acre and a maximum of 24% built-upon area, and requires a watershed control plan for all non-residential development, and a Watershed Critical Area within 1/2 mile of the normal pool elevation of the reservoir, with a maximum of 1 du/acre and a maximum of 12% built-upon area. Allows cluster development. Requires a 30-foot vegetative buffer along perennial waters.	

Danville

For example, Danville's water treatment plant is currently testing for emerging contaminants, such as medications and personal care products. This is not currently required, but Danville wants to establish a baseline. They are also attempting to reduce disinfection byproducts, even though they are well within the limits of their permits (Dunkley, 2010). While these steps are primarily for the purpose of protecting drinking water supplies rather than the health of the river, they could have an indirect effect on water quality in the river if they result in new controls on discharges, or attempts to keep the river free of nutrient pollution to reduce disinfection byproducts. The city also tries to protect the riverfront by requiring special use permits for development there. However, little development is likely to occur in that area because it is mostly built out (Blair, 2010).

Danville also built a rain garden using a grant. The garden captures runoff from impervious surfaces upland from it. The fact that the city was able to obtain a grant was essential to the construction of the rain garden: "In this economic environment, to just go out and start doing things like this on our own other than what's required, if it's not under a grant or funded in some alternative way, I don't see us doing. Now, if economic times got a lot better, maybe it would be different" (Dunevant, 2010).

While Danville has stricter storm water regulations than the other three cities due to its NPDES Phase II status, it has been difficult for the city to adjust to the new requirements and adequately enforce the new regulations. For example, Danville currently requires storm water BMP maintenance agreements for private owners of BMPs. The city is attempting to start a BMP inspection program, but it would require additional staff, making it hard to confirm that BMPs are functioning properly (Dunevant, 2010).

Reidsville

According to Reidsville's Community Development Director, the city's storm water ordinance is the only watershed protection in the part of the city within the Dan River Basin, and it offers minimal levels of protection based primarily on state requirements. A storm water permit and an engineering study are required for more than 10 acres of land clearing (Pearce, 2010). The section of the city that is within the Cape Fear Basin will be subject to stricter land use regulations in the future to comply with state regulations protecting Jordan Lake. Reidsville pays close attention to wastewater treatment: "We do monitor the wastewater from our industries pretty closely. You're always right on the verge of not meeting the minimum requirements. In fact the, city of Reidsville was under a moratorium and monitored very closely for a while because we could not get one of our pollutants under control… It's very important, obviously, to be in compliance, and we work very hard at that… I think the goal we look at is trying to find ways to be in compliance and improve the cost and efficiency of the operation" (Pearce, 2010). Eden, Danville, and Martinsville, by contrast, all report being well within limits on pollutants. This may be due to the fact that their wastewater treatment plants were built to handle textile wastes (Dunkley, 2010; Dyches, 2010; Ward, 2010).

Eden

Eden organizes river cleanups several times a year with volunteers, city staff, the Dan River Basin Association, and Piedmont Natural Gas (Farmer, 2010). They have also applied for two separate grants to fund their greenway program. In addition, the city is spending some of

their community development block grants on storm water improvement in a neighborhood (Stultz, 2010).

Eden also successfully applied for a grant from the state last to shut down a small, outdated plant and route the wastewater to the main plant. However, the funding was cut. The main problem Eden's wastewater treatment plant has is overflows during heavy rains, which can flow out into streams and rivers. The city is trying to deal with that by replacing its sewer lines, some of which are very old and eroded, to reduce the load on the collection system. Eden's wastewater treatment plant does not do any additional treatment beyond what is required by their permit, but they still meet and exceed all legal requirements limiting discharges. They might look into nutrient removal if they can find a way to feasibly do it. It is not required yet, but the plant superintendent thought it likely would be in the future. However, according to the superintendent, a wastewater treatment plant is not likely to perform additional steps not required by law because to do so requires funding, and they cannot get funding unless it is a necessity. Eden's plant is an extended aeration plant, which has the ability to deal with a wide range of pollutants more effectively than a standard plant. However, the superintendent was not certain that the design was due to the needs of Eden's industry; rather, she thought it was coincidental (Ward, 2010).

Martinsville

Martinsville's drinking water supply, the Beaver Creek Reservoir (fed by Beaver Creek, a tributary of the Smith River), is protected by zoning around the reservoir that limits land uses to primarily agricultural and residential. The water quality in the reservoir is generally good (Dyches, 2010).

Martinsville's wastewater treatment plant, which empties into the Smith River, is an extended aeration activated sludge plant (Dyches, 2010). Unlike Eden, where the development of an extended aeration plant was primarily happenstance (Ward, 2010), Martinsville's plant was designed with the specific purpose of handling wastes from textile plants. Like in Eden, the plant usually come in well below legal limits on suspended solids and on contaminants. However, they also have occasional problems with overflows during heavy rains, although Danville's Director of Water and Wastewater did not think they were unusual. The city's sewer ordinance requires all residents in the city to be connected to the sewer system in order to control discharges, and the city has an industrial pretreatment program for industries with potentially hazardous discharges. The Director of Water and Wastewater did not think that Martinsville had any storm water controls beyond the minimum required by state law (Dyches, 2010).

Martinsville's Leisure Services Director had recently tried to partner with the Dan River Basin Association to plant riparian buffers. The project was initiated and funded by DRBA, but the city was ultimately not able to partner with them because DRBA ran out of funds (Cody, 2010). I asked him if he was interested in riparian buffers because he though they would impact recreation. He answered, "Anytime you can promote the health of your streams in your advertisements, I think that really helps… Anytime you can focus on the water quality, I believe people relate to clean water, rather than maybe a stream they live beside that cows have access to, which is kind of illegal but kind of overlooked" (Cody, 2010). However, while he saw water quality as important to recreation, his interest in the buffer project was not because of any water quality problems that hampered recreation. Rather, he also expressed a belief that there are inherent benefits to environmental protection: "That's kind of a passion for me to bring to my department. Not really what our mission is, but anytime you can teach a kid to be more environmentally sound, they just seem like they turn out to be a better individual as they grow

up. That's just a philosophy of mine that I try to bring to my department, whenever a child respects his/her environment, then the child will respect himself/herself and others they surround themselves with" (Cody, 2010). Martinsville's Leisure Services Director's attempted riparian buffer project was the only water quality project I identified that was explicitly intended to benefit recreation. However, the project demonstrates that the values of individuals involved in recreation can influence actions taken by cities regardless of economic considerations.

INFLUENCE OF WATER QUALITY ON TOURISM AND RECREATION ACTIVITIES

Water quality was seen as an important factor in encouraging outdoor tourism and recreation. However, other factors were discussed in interviews as playing a role in the level of use of rivers and lakes. Opportunities for access to the river or lake frequently came up in conversations (Blair, 2010; Dunkley, 2010; Sgrinia, 2010; Stultz, 2010; Ward, 2010). Interviewees often listed the creation of boating ramps, greenways near the river, riverside parks, fishing areas, and campgrounds when detailing the city's attempts to encourage use of the rivers (Adams, 2010; Blair, 2010; Cody, 2010; Farmer, 2010; Merritt, 2010; Pearce, 2010; Sgrinia, 2010; Yount, 2010). Aesthetic issues – the appearance or smell of the water – were also seen as a factor in the public's willingness to use the river recreationally (Cross, 2010; Dunkley, 2010; Dyches, 2010; Farmer, 2010; Sgrinia, 2010; Stultz, 2010; Ward, 2010). Fishing opportunities also played a role in making waters popular for recreation (Cody, 2010; Cross, 2010; Dunkley, 2010; Dyches, 2010; Farmer, 2010; Merritt, 2010; Sgrinia, 2010; Stultz, 2010). Finally, activities such as concerts or festivals near the river or emphasizing the rivers were often described among the cities' efforts to promote use of the rivers (Adams, 2010; Blair, 2010; Cody, 2010; Sgrinia, 2010; Yount, 2010)

The importance of aesthetics to recreation and tourism, as well the relationship between water quality and appearance, were topics that often came up in interviews. Their statements reveal that aesthetics matter to visitors and residents making decisions about whether to use a water body for recreation, and can affect public perception of water quality in the river, even when problems with appearance do not actually affect public health or the health of the river. At the same time, interview subjects also spoke of residents becoming accustomed to the appearance of water that was polluted by sedimentation or dyes and using the rivers despite their appearance.

The presence of dye in the water when textile mills were common was frequently mentioned. The actual health risks seemed to have influenced the public's reaction to the dye less than the appearance, and changes in residents' opinions of the dye were more dependent on changing sentiments about the environment than on the level of color or the toxicity of the dye (Adams, 2010; Dunkley, 2010; Dyches, 2010; Farmer, 2010; Stultz, 2010; Ward, 2010).

Eden

Eden's Superintendent of Wastewater Plants gave the following analysis of the issue of dye contamination:

> [Dye discharges] did bother people to a degree, because they knew that was where their drinking water was coming from, but a lot of

> the issues were not necessarily with Eden as much as it was with the plants in Virginia. Their plants had the same thing - they had textile industries with dyeing operations which were affecting the river and changing its colors. This flow would eventually come down here. I've heard different stories, although I have not lived here long enough to have seen this. People talk about how they never knew what color the river was going to be. You know, it could be green one day and red the next. It was something most people just got used to because that was the way it had always been. But it did start creating concern when people learned more about the environment and were educated more about the hazards that could be present in some dye waste. They started having concerns about, what's this doing to our drinking water? (Ward, 2010).

This comment suggests that the appearance of the water was not, by itself, enough to affect people's willingness to use the river. Instead, growing knowledge of the potential environmental effects of discharges into the river is what engendered concerns about the river's appearance and what this might indicate about its health.

While she thought that increased awareness of the condition of the river was positive, she was bothered that people based their concerns on appearance and that they sometimes erroneously assumed that the wastewater treatment plant was polluting the river: "Now it's like, the river is clear, so if they ever see anything it sends up red flags immediately. Before, it was just a normal way of life, but when you start cleaning up stuff and making people aware, then it becomes something where everybody wants to be involved. They feel like we've got to stop this, or they want to know what's causing this? It's good that people are aware as long as they understand what they're talking about" (Ward, 2010).

She also said that despite the appearance of the dye, residents still fished and swam in the rivers. However, as residents and visitors became more aware of environmental issues, they also became more wary of the effects of dye on the river, even as non-toxic dyes began to be used and the treatment plant became able to better control color: "Well, I guess they never really paid attention to it. It was actually probably more dangerous back then because the dyes contained a lot of heavy metals, whereas the dyes that were used recently were different components, didn't contain the same types of contaminants, so it was more just an aesthetic thing. You know, it looks bad, but it's not really bad. Whereas before, it was probably bad, and looked bad, but they just didn't know or think about it" (Ward, 2010). She explained that even once the plant had begun to use a polymer to remove dye, a faint trace of color was sometimes still visible in the effluent, and that this had concerned people: "It looked bad, because you're used to clear water, and you're not sure why it's a different color. It was just a perception of how it looked" (Ward, 2010). She thought that, now that the last dyeing industries had left Eden, the public's perception of how clean the river was had improved, saying "now, [the effluent is] actually completely clear, so if you rode by you would see water that is actually clearer probably than the river water going by. If anything, it looks like it's probably improving some of the conditions, because the Dan River's consistently muddy. What we have going out is almost as clean as drinking water right now, so it would actually improve the quality of the river…You may see where the water is

coming from, but it shouldn't have any impact on the surroundings. This should help as far as making the boaters feel safer" (Ward, 2010).

Even though the cities did not seem to be motivated by tourism and recreation to improve water quality, Eden's Superintendent of Wastewater Plants indicated that recreational use of the river might have led to stricter controls at the state level. Discussing the presence of dye in the plant's effluent, she said, "…the state stepped in and started requiring some sort of color removal for this area at least, I guess because more people were on the streams, which were trout streams. It had more of an impact. Not everybody in the state that has dyeing operations has limits or are required to remove the color. Now most dye waste contains no real harmful chemicals, but it is an aesthetic problem in that people know that it is not natural to have colored water. As of today, the majority of our dyeing operations have closed down, so we don't see the same effects as we did just a year ago" (Ward, 2010). This anecdote suggests that even though local regulation seems driven by state regulation, this does not mean that tourism and recreation cannot motivate improvements to water quality at all. Rather, it suggests that the state might be in a better position to impose new restrictions than local government.

The Wastewater Plant Superintendent said that recreation has come up in discussions of water quality in Eden. Although the treatment plant's effluent is well within the standards of their permit, the outlet is in an area that boaters go through, and its appearance is a concern. The superintendent explained, "Because we have effluent going directly into the river, boaters can go right by it if they're on that section. So it's not an attractive thing if they see something that they perceive to be bad or wrong, even if it isn't. We want our water to be of the highest quality anyway, and we do help local watch groups with some of the testing. We do a few extra coliform tests just to make sure that we're not seeing high amounts of bacteria upstream or dramatically increasing downstream from our effluent. We're not having an impact on the river – we've kind of proved that point with our years of data. So it kind of helps to know that when people go out there on their boats, they're safe. It's just like any other river, as far as that goes" (Ward, 2010). Eden's Parks and Recreation Department said that his department also tries to maintain the appearance of the river access sites (Farmer, 2010).

Danville

In Danville, the Director of Water and Wastewater, an Associate Planner, and the Outdoor Recreation Director each observed that the muddiness of parts of the Dan might be acceptable to residents, but a turn off to visitors (Blair, 2010; Cross, 2010; Dunkley, 2010). The Outdoor Recreation Director thought that people from other areas who are used to clear streams were often bothered by the muddy appearance, but that they tended to become accustomed to it with time and become more receptive to using the river recreationally (Cross, 2010).

CONCLUSION

When asked why they thought it was important to protect watersheds, most interview subjects indicated that it was intrinsically important, as well as that it was necessary for legal reasons and for protecting residents' quality of life, in addition to economic motivations. Most interviewees also did not indicate that they perceived a significant tradeoff between environmental protections and economic development; rather, most expressed the sentiment that water was an important resource that needed to be protected. Both extractive and amenities-based values were prevalent in discussions. Interestingly, few people saw conflicts between these two sets of values; rather, they thought that both required good water quality. The conflicts that

did appear were between the motivation to protect water quality and individual landowners' or developers' desire to prevent government interference in land use.

Drinking water supply was a more important concern than tourism and recreation. Most people I spoke to said they would protect water to the same extent even if there were no tourism or recreational use of the water. In the case of Martinsville and Reidsville, where the drinking water supply comes from a reservoir rather than the river, the kinds of recreational activities allowed in the reservoir have to be limited to protect the drinking water supply. Regarding the rivers, interviewees generally agreed that their city would not create additional regulations, such as restrictions on land use around the river, with the primary purpose of benefiting recreational use of the rivers. However, they also felt that the quality of the water resulting from state or federal regulations such as the Clean Water Act, or from the city's efforts to protect the water supply, made recreation in the rivers possible.

In addition, the importance of providing recreational opportunities for residents was seen as equally or more important than tourism. Nearly everyone I spoke to agreed that tourism and recreation are a significant part of their respective city's economy. Out of town visitors who stay in hotels and eat at restaurants are obvious examples. Businesses that cater to outdoor recreation also benefit, such as the bike shop in Danville that caters to people using the riverfront trails, or several businesses in Eden and one in Martinsville that rent boats and organize tours (Cody, 2010; Yount, 2010, Adams, 2010). However, the effect that recreation had on quality of life for residents often trumped attracting tourists, and quality of life was mentioned several times as a factor that can attract employers to a city (Blair, 2010; Dunkley, 2010; Farmer, 2010; Merritt, 2010; Pearce, 2010; Yount, 2010).

Regarding the economic impacts of waters besides tourism, the following themes emerged:

- For industrial development, quantity is generally more important than quality; however, quality is still a very important consideration (Dunkley, 2010; Dyches, 2010; Pearce, 2010; Stultz, 2010).
- The abundant supply of water in this region is a big selling point for industrial development, and can be important to the sale of water, which is a major source of revenue. However, there is a lot of competition. Each of the four cities reported having a large and reliable water supply as well as excess capacity in their water and wastewater treatment plants (Dunkley, 2010; Dyches, 2010; Pearce, 2010; Shelton, 2010; Stultz, 2010; Ward, 2010).
- Water quality and recreational opportunities affect residents' quality of life, and this can influence economic development by influencing business's and individuals decision to locate in a city (Blair, 2010; Dunkley, 2010; Pearce, 2010; Stultz, 2010; Yount, 2010).

City staff that I interviewed expressed similar levels of acceptance of environmental regulations, and similar beliefs that water quality is important and that regulations protecting water quality are worthwhile. No one described demands being made of them to protect water quality as unreasonable. Several also thought standards would be raised over time, and while they may have had some concern about their ability to meet increasing requirements, no one said anything to suggest that stricter requirements would be unreasonable or seriously burdensome, and most were trying to prepare for changes. Interviewees expected standards to be raised, not necessarily because of problems within the Dan River Basin, but because of increased statewide

regulations, possibly as side effects of the more restrictive Jordan Lake rules affecting regions south of the Dan River Basin and regulations on the Chesapeake Bay watershed to the north of the Basin (Dunevant, 2010; Dunkley, 2010; Dyches, 2010; Pearce, 2010; Ward, 2010).

The attitudes of the interview subjects most closely reflected the results of willingness-to-pay studies that found that members of the public are motivated by public health, preserving the environment for future generations, intangible benefits, and option value, existence value, and bequest value (Lant and Roberts, 1990; Greenley, Walsh, and Young, 1981). This suggests that the factors that motivate people involved in decision-making within government might be similar to the motivations of the general public. However, compared to the general public, the city government employees I spoke to might be more driven by the motivations to preserve natural resources, comply with regulations at the state or federal level, and protect drinking water supplies. Residents or business owners might share these motivations, as indicated by the willingness to pay studies referred to above, but they might also be more strongly driven by their own economic interests, particularly if they own land where development would be affected by regulations. This conflict was reflected by comments about the difficulty of requiring developers to comply with storm water regulations in Danville, property owners interested in developing homes around Lake Reidsville, or resistance to Eden's watershed protection ordinance when it was enacted (Dunevant, 2010; Pearce, 2010; Stultz, 2010).

Interestingly, the interviews did not reflect conflicts between newcomers and long-term residents that frequently appeared in the literature discussing natural resources in rural areas. This literature indicated that long-term residents tended to favor extractive industries while newer residents tended to favor amenities provided by natural resources. Eden's Coordinator of Tourism and Special Events did mention that people who moved to Eden might feel more of a sense of identification with the river, but no one indicated that there were conflicts between newcomers and older residents over use of the river (Adams, 2010). One possible explanation for the apparent lack of conflict is that this region has experienced relatively little growth in the past few decades, minimizing opportunities for conflicts. Another explanation, however, is that extractive and amenities based values are more compatible in the case of rivers than they are in the case of other natural resources; most of the water that is extracted from the river is ultimately returned as wastewater, and if it is adequately treated does not affect the value of the river as an amenity. Most people I spoke to agreed that the region had a large enough supply of water that droughts or the sale of water had not noticeably affected the region.

Most people I interviewed expressed favorable attitudes toward efforts to improve water quality, even if doing so incurred additional expenses or required additional limits on industry or land use. However, they also agreed that their cities would be unlikely to impose additional levels of regulation or invest a great deal of money in improvements to water quality unless they were required to by the state or federal government, a serious or well publicized problem was identified, or they received outside funding to carry out a project such as building a BMP. The reluctance to take additional measures was due to a combination of insufficient resources, belief that the current level of water quality was good enough, or lack or public and political will (Dunevant, 2010; Dyches, 2010; Pearce, 2010; Stultz, 2010; Ward, 2010). . City staff were most likely to encourage voluntary activities, such as litter clean-up days or educating property owners about riparian buffers, or projects funded by grants, such as Danville's rain gardens (Cody, 2010; Dunevant, 2010; Farmer, 2010). Interest in protecting water bodies seemed to be related to the degree of impact they had on the city; Reidsville's Community Development Director's statement that the city was not under pressure to protect the Dan River Basin, unlike Lake

Reidsville, is one example. However, state and federal requirements, more than the level of attention residents and local government pay a particular water body, seem to determine what regulations the city has in place.

While city staff held similar beliefs, their discussions of interactions with the public suggest that the degree to which residents can access the river for recreational purposes might affect their willingness to accept regulation, their sense of pride in the river, and their level of identification with the river. Eden's residents seem to have the strongest sense of identification with the rivers. The rivers there are highly visible and easily accessed, and residents frequently used them for regulation even before the city developed access points and greenways (Adams, 2010; Farmer, 2010; Stultz, 2010). The river in Danville is highly visible, but has historically been less accessible, and the presence of two dams limits the potential for recreation (Blair, 2010; Dunkley, 2010; Sgrinia, 2010). Martinsville has limited access to the river from within the city, and it has only recently become an area of emphasis for the city's parks and recreation and tourism departments (Cody, 2010). Residents of Reidsville are strongly interested in using Lake Reidsville for recreation, but are less likely to think of the Dan River as having a connection to the city, and are also do not think of the lake as a city facility (Pearce, 2010).

My discussions gave me the impression that residents and businesses in Eden had the greatest level of acceptance of land use restrictions for the purpose of protecting water quality, while residents in Danville more strongly resisted such regulations (Stultz, 2010; Dunevant, 2010). This is based on the perspectives of government staff, rather than members of the public in each city, and therefore might not be an accurate reflection of public attitudes. Furthermore, it is possible that Danville residents and businesses object to regulations more strongly because they are under stricter NPDES Phase II regulations, while the other three cities still have relatively lax regulation, and because the Phase II regulations are relatively new to the city.

This research seems to indicate that tourism and recreation development have relatively small impacts on the level of regulation of water quality or investment in water quality improvements by local government. However, it does seem to have an effect on residents' interest in the rivers and their acceptance of regulations protecting water quality. Because residents were not surveyed, this cannot be confirmed. However, it would be interesting for future research to examine whether access to rivers affects public environmental attitudes. It should also be noted that most of the impairments that exist in the basin were not seen as severe enough to seriously hamper recreational use. Similar study of a region where impairments exist that would endanger the health of swimmers or fishers might produce different results.

In summary, I found that recreation and tourism development are not likely to motivate cities to improve water quality. Rather, providing residents with clean drinking water and meeting state and federal requirements are the main motivations. The cities I examined are not likely to create regulations or carry out projects that are not required of them because of insufficient resources, and because of the difficulty of convincing residents and businesses to accept new regulations. This might be different in cities with greater resources. Cities that have more severely degraded rivers might also respond differently. However, the cities I looked at did see good water quality as a resource, and the people I interviewed thought the expense and effort required to protect water quality were outweighed by the benefits. The benefits interviewees listed included quality of life for residents, water resources for industrial use, tourism and recreation, and non-economic values-based benefits. The level of access to the rivers, the degree to which residents used the rivers recreationally, and the degree to which cities focused on rivers as focal points of tourism and recreation did not seem to affect ordinances or projects meant to

improve water quality, or the degree to which city government staff thought water quality is important. However, recreational access to the rivers might affect residents' interest in and awareness of water quality issues in the rivers. This could possibly explain why staff in Eden, which offers the highest level of recreational access to the rivers, seemed to have encountered less resistance from the public. It also seemed to be behind the strong sense of identification with the rivers that seemed to exist in Eden. This suggests that, even if recreational opportunities emphasizing the rivers do not actually affect regulations, they might affect compliance with the regulations by residents. It is not clear that recreation or tourism motivate cities to clean up rivers. However, it might motivate cities to carry out smaller projects when funding is available, or make property owners more willing to comply with regulations. I also found that water quality can negatively impact tourism, but that the appearance of the river can also affect the attractiveness of the river for recreation, and perceptions of water quality rather might have a bigger affect on recreational use of the rivers than actual pollution. The implication of this is that cities interested in encouraging recreation around rivers need to focus on appearance as well as water quality. This research also suggests that increasing recreational access to the river might not lead to additional regulations or major projects to improve water quality, but it does seem to improve public awareness of water quality issues. It is possible that this affects individual behaviors affecting water quality, which could make it easier to encourage property owners to better manage stormwater on their property, for example. Further research could be done to determine this is the case.

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APPENDIX:

Table 3: Interview participants

Name	Title	City
Adams, Cindy	Coordinator of Tourism and Special Events	Eden, NC
Blair, Renee	Associate Planner	Danville, VA
Cody, Gary	Leisure Services Director	Martinsville, VA
Cross, Karen	Outdoor Recreation Director	Danville, VA
Dunavent, Brian, E.I.T.	Public Works Project Engineer	Danville, VA
Dunkley, Barry	Director of Water and Wastewater	Danville, VA
Dyches, John	Water Resources Director	Martinsville, VA
Farmer, Johnny	Director of Parks & Recreation	Eden, NC
Merritt, Chad	Lake Reidsville Park Supervisor	Reidsville, NC
Pearce, Michael, AICP	Community Development Director	Reidsville, NC
Sgrinia, Bill	Director, Department of Parks, Recreation, and Tourism	Danville, VA
Shelton, Terry	Water Plant Superintendent	Eden, NC
Stultz, Kelly	Planning & Inspections Director	Eden, NC
Ward, Melinda	Superintendent of Wastewater Plants	Eden, NC
Yount, Robin	Vice President of Tourism, Rockingham County Partnership for Economic & Tourism Development	Rockingham County